Boeing has to define its core competences and tackle severe supply chain issues.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Complication</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing is industry leader until recently</td>
<td>Transition to “Built to Performance” has been challenging. Boeings’ future competitive advantage is unclear.</td>
<td>How can Boeing avoid or reduce supply chain challenges? How can Boeing leverage the 787 experience to create long term competitive advantage?</td>
<td>“Build to Fly”, a new supply chain strategy: Boeing BIO1000, a fuel efficient medium sized aircraft.</td>
</tr>
<tr>
<td></td>
<td>Agenda</td>
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<tr>
<td>1.</td>
<td>Situational analysis</td>
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<td>2.</td>
<td>“Build to Fly”</td>
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<tr>
<td>3.</td>
<td>The Boeing BIO1000</td>
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<td>4.</td>
<td>Timeline and financials</td>
<td></td>
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<tr>
<td>5.</td>
<td>Wrap-up</td>
<td></td>
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</tbody>
</table>
Agenda

1. Situational analysis
2. “Build to Fly”
3. The Boeing BIO1000
4. Timeline and financials
5. Wrap-up
Boeing has transformed itself from an aircraft manufacturer to a master planner - not without complications.

The transformation from manufacturer to master planner has cost two years delay and close to $2.5 billion.
The shift from “Build to Print” to “Print to Performance” has been problematic.

<table>
<thead>
<tr>
<th></th>
<th>Build to Print</th>
<th>Build to Performance</th>
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</thead>
<tbody>
<tr>
<td><strong>In theory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developer skills</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Higher innovation</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Risk sharing</td>
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<tr>
<td><strong>Reality</strong></td>
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<tr>
<td>Miscommunication</td>
<td>-</td>
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<tr>
<td>Delays</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Lack of control</td>
<td>-</td>
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</table>
## Current Market Situation

- Increased competition in the Large Carrier Aircraft (LCA) market
- Postponements by Boeing and Airbus create opportunities for new entrants

## Threats

- Airbus and Boeing could potentially lose 50% of the single aisle market to new entrants
- Estimates state that Airbus/Boeing could lose 50% of the single aisle market
- Postponements by Boeing and Airbus create opportunities for new entrants
New civil aircraft competitors on the horizon despite high costs of entry; four major potential competitors

**China**

Commercial Aircraft Company of China (C China) is building up manufacturing capacity.

- Fastest growing aviation market
- Passengers predicted to grow 11% annually over next 20 years
- Highly subsidized, around $3 billion

**Canada**

Bombardier (Canada)

- Furthest along of new entrants – has begun Cseries – 100 to 130 seat aircraft with ETA in 2013
- Skills within manufacturing, support infrastructure and brand recognition
- Lack of financial resources

**Russia**

Tai Civil Aircraft Company (SCAC Russia)

- Highly subsidized, around $1 billion
- Plan to build LCA with up to 150 seats in the next 10-15 years

**Japan**

Kawasaki Heavy Industries (KHI)

- Major advantage is experience with building critical aero structures from composites
- Lacks the levels of fiscal support available to the Russian and Chinese companies
Agenda

1. Situational analysis
2. “Build to Fly”
3. The Boeing BIO1000
4. Timeline and financials
5. Wrap-up
"Build to Fly" will increase global integration by leveraging the best from the previous strategies.
“Hold to Print” was constrained by heavy specification needs by Boeing, and development was kept in-house.
Build to Performance” lowers specification requirements and outsources development.
"To Fly" facilitates collaboration around development and specifications.
“Build to Fly” facilitates communication between partners throughout the supply chain.

- Facilitating links between suppliers
- Improving coordination

Creating supply chain visibility
- Status on delays
- R&D information
- Better quality control

Improved coordination between partners

Increased communication decreases potential delays and costs
Coordination Teams will facilitate communication and control.

Monthly meetings between representatives facilitate knowledge.
"Build to Fly" will address issues of control, performance and supply chain visibility.

<table>
<thead>
<tr>
<th></th>
<th>Build to Print</th>
<th>Build to Performance</th>
<th>Build to Fly</th>
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<tbody>
<tr>
<td>Cost</td>
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<tr>
<td>Control</td>
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<td>Speed</td>
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<td>Flexibility</td>
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<td>Reliability</td>
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<tr>
<td>Flex</td>
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<tr>
<td>Supply Chain Visibility</td>
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</table>

Boeing Logo
"Build to Fly" will address issues of control, performance, and supply chain visibility.

<table>
<thead>
<tr>
<th></th>
<th>Build to Print</th>
<th>Build to Performance</th>
<th>Build to Fly</th>
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<tbody>
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<td>Cost</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Control</td>
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<tr>
<td>Reliability</td>
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<tr>
<td>Risk</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Supply Chain Visibility</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tbody>
</table>

Legend: ☐ - Not Addressed; ☐ - Addressed
Comprehensive information campaigns will inform stakeholders of the new initiatives.
### Agenda

1. Situational analysis
2. “Build to Fly”
3. **The Boeing BIO1000**
4. Timeline and financials
5. Wrap-up
Future total deliveries are expected to be highest in North America, Europe and Asia Pacific.
Expected demand for single-aisle planes accounts for 67% of new deliveries.

New airplanes 2008-2028 = 29,000

Asia Pacific, North America and Europe show high growth in single aisle airplanes.
Current product offering shows potential in single fleet family.
Market forecasts predict increased demand for short-medium sized carriers.

Ageing 737’s and increased innovations provide opportunity for new aircraft developments.
Environmental sustainability and rising fuel costs becoming ever more important issues

Rising Fuel Costs
International Awareness
Sustainability is key
Political Pressure

The price of jet fuel continues to be the greatest threat to industry profitability”

Transport Association, Boeing Material
Up-to-date technical specifications will provide competitive advantage.

<table>
<thead>
<tr>
<th>Passengers</th>
<th>Boeing 787-10 Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>148-157</td>
</tr>
<tr>
<td></td>
<td>174-188</td>
</tr>
</tbody>
</table>

Maximum range
4-5500 nautical miles

Key innovative advantages:

**Fuel efficiency:**
- Environmentally friendly fuel mix (45% Sustainable / 55% Traditional)

**Consumer comfort:**
- Innovative solutions to complications such as interior design and relaxation

**Composite materials:**
- Utilization of lightweight materials and composites

<table>
<thead>
<tr>
<th>Basic Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing Span</td>
</tr>
<tr>
<td>~32.3 m</td>
</tr>
<tr>
<td>~34.6 m</td>
</tr>
<tr>
<td>Overall Length</td>
</tr>
<tr>
<td>~37.4 m</td>
</tr>
<tr>
<td>Tail Height</td>
</tr>
<tr>
<td>~11.9 m</td>
</tr>
<tr>
<td>Interior Cabin Width</td>
</tr>
<tr>
<td>~3.53 m</td>
</tr>
</tbody>
</table>
“Build to Fly” ensures broader innovation and continuous control.

Ensuring Innovation & Control

- Latest technology
- On-time delivery
- Integration and collaboration with partners
The Boeing BIO1000 will ensure Boeing’s position within commercial aircraft.

- Targeting the fastest growing market segment
- Satisfying the 2016 Vision
- Using “Build to Fly”
- Replacing Boeing 737
- Responding to demand for sustainability
- Satisfies consumer needs - time and comfort
- Satisfying the Triple Bottom Line
000 will implement innovative solutions within solar energy, fuel efficiency, interior design and consumer fort.
Example 1: There are ample opportunities for revolutionizing interior design aboard Boeing crafts.

- Capture vertical space
- Can be converted to an economy-class set-up on demand
Several potential buyers have been identified in the growing Low-Cost Carrier segment.

- **North America**
  - Fleet size: 537 jets
  - Boeing 737 jets
  - Average Age: 10.5
  - Routes: 1,100

- **Europe**
  - Fleet size: 230 jets
  - Boeing 737 jets
  - Routes: 1,100

- **Asia Pacific**
  - Fleet size: 222 jets
  - Routes: 400+
Agenda

1. Situational analysis
2. “Build to Fly”
3. The Boeing BIO1000
4. Timeline and financials
5. Wrap-up
Optimizing supply chain gives major savings at a small cost

<table>
<thead>
<tr>
<th>Assumptions &amp; Estimates</th>
<th>Now</th>
<th>Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. delay to completion</td>
<td>600</td>
<td>300</td>
</tr>
<tr>
<td>Avg. % complete (- failure)</td>
<td>70</td>
<td>95</td>
</tr>
<tr>
<td>Planes manufactured pr. month</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value of “Build to Fly” project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings</td>
</tr>
<tr>
<td>Costs</td>
</tr>
<tr>
<td>Net value</td>
</tr>
</tbody>
</table>
Launch of BIO1000 negates potential market share loss from new competitors

Assumptions & Estimates

- Growth of single aisle 90-175 seat planes will be constant towards 2050
- Single aisle planes sold after 2024 are Boeing Bio1000 planes
- Market share will halve if no competitive is taken (Market report)
- Additional costs regarding Boeing 100K project approx 6.6 Bn USD
- Project C 11 %

Potential loss/gain increases over time

Value of “Boeing BIO1000” project

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Case</td>
<td>$8,756,000,000</td>
</tr>
<tr>
<td>Worst Case</td>
<td>n/a</td>
</tr>
<tr>
<td>Base case</td>
<td>$2,079,000,000</td>
</tr>
</tbody>
</table>
Idtofly

Information Campaign
Tier 1 Controller Team
1st Execution
Information and 2nd Execution

NG BIO1000

Ensuring BIO1000 Task Force
Product Development
Ensure Funding
Application Process
Phase out 737
Agenda

1. Situational analysis
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Maximizing Boeing’s global value chain integration

**How**
- Increased collaboration
- Establishment of Coordination Teams

**When**
- Initial information campaign
- Hiring process to commence ultimo August 2010

**Why**
- Address lack of control
- Hinder further delays
- Create a synergy through communication
Introducing Boeing's Future Competitive Edge with the Introduction of Boeing BIO1000

**How**
- Introducing Boeing BIO1000
- “Build to Fly” ensures Innovation and Control
- Cutting edge solutions

**When**
- 2010 Task Force
- Start product development in 2015 and phasing out the 737
- Launch 2025

**Why**
- Large forecasted demand
- Environmental sustainability,
- Synergy effects through communication
“Build to Fly” and Boeing BIO 1000 addresses the key issues facing Boeing. Together the two proposals ensure that Boeing stays a crucial part of a more sustainable tomorrow.
Recommendation

Issue slide
Transformation
Competitors

"Build to Fly"
Coordination Teams
Future total deliveries

Current product offering
Boeing BIO1000
BIO1000 innovative solutions

Financials
Timeline
How, Why, When

Appendix

Manufacturer to Master Planner

Triple bottom line
Risk Mitigation
Contingency Plan
Contact, Control, Contract

Comparison of Airbus & Boeing
Market tendencies
Union Member Challenges
Airbus expectations
Biofuel
Boeing has shifted from manufacturer to master engineer.

<table>
<thead>
<tr>
<th>Build to Print</th>
<th>Build to Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing engineers develop the design</td>
<td><strong>✓</strong> Suppliers do the innovation, drawings and tooling themselves</td>
</tr>
<tr>
<td>Boeing partners build according to exact specifications</td>
<td><strong>✓</strong> A complete shift in responsibility – suppliers fully responsible</td>
</tr>
<tr>
<td>Detailed manual with drawings and technicalities – hundreds of pages</td>
<td><strong>✓</strong> Boeing makes a short request to suppliers with specifications – tens of pages</td>
</tr>
<tr>
<td>Boeing engineers quick to intervene if suppliers need technical assistance or if they are not building according to specifications</td>
<td><strong>✓</strong> Financial risk now lies with suppliers</td>
</tr>
<tr>
<td><strong>0%</strong> Internal R&amp;D</td>
<td><strong>✓</strong> R&amp;D</td>
</tr>
</tbody>
</table>
Build to Performance”
good idea – but not effectively executed

Utilize technology and technical talent from around the world
Ensure up-to-date innovation
Risk sharing
Value Chain visibility
RFID tags
Strengthened B2B Network

In Theory

In Practice

• Miscommunication
• Unnoticed Delays
• Lack of Control & Quality
• No Incentives Systems for Suppliers
• Outsourcing Core Competences
• Financial Penalties
Supply Chain best practise from the auto industry cannot be transferred to the aircraft manufacturing industry.

<table>
<thead>
<tr>
<th></th>
<th>Toyota</th>
<th>Boeing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>8.540.000 / year</td>
<td>480 / year</td>
</tr>
<tr>
<td>Parts (avg.)</td>
<td>14.000</td>
<td>5-7.000.000</td>
</tr>
<tr>
<td>Price (est.)</td>
<td>~ $30.000</td>
<td>~ $50-305.000.000</td>
</tr>
<tr>
<td>Lifespan (est.)</td>
<td>10 years</td>
<td>25-30 years</td>
</tr>
<tr>
<td>Complexity</td>
<td>Medium</td>
<td>Very high</td>
</tr>
</tbody>
</table>
ing can sustain its future competitive advantage by establishing itself as a Master Planner.

The Boeing 2016 Vision

**Strategies**
- Run healthy, core businesses
- Leverage strengths into new product
- Open New Frontiers

**Values**
- Leadership
- Cooperation
- Integrity
- Quality
- Customer Satisfaction
- Diverse & Involved Team
- Good Corporate Citizenship
- Enhancing Shareholder Value

A commitment to understanding and anticipating customer needs and excellent supplier management with high quality, efficiency and low transaction costs.
Specially competitive issues makes a placement of the aging Boeing 737 necessary.

**3 main reasons behind replacement**

**New profile**
- Improved abilities
- New found competencies

**Already plans regarding replacement**
- Advance plans on replacing 737
- Is already part of future strategy

**Technological inferior**
- Cannot compete with new competitors
- Needs to brand itself in current world
Incentive structures

- On-time delivery
- Punctual delay announcement
- Completion rate

**Short term:**
- Completion rate decides bonus size

**Long term:**
- Continued successive completion rates over 95% releases continual bonus until break
- Creates longer lasting relationships and more experienced partners
Being ensures sustainability by focusing on the triple bottom line:

- **People**
  - Boeing Build to Fly: Shareholders & Employers
    - Ensuring continuous workflow
    - Limiting unnecessary delays
    - Streamlining production process

- **Planet**
  - Boeing Bio1000: Shareholders & Customers
    - Avoiding costly compensations
    - Tapping into new growth markets

- **Profit**
  - Boeing Bio1000: Environmental Goals
    - Sustainable energy sources
    - Efficiency
Potential risks can be mitigated by closely monitoring market developments.

**Risk**  
- "Build to Fly" strategy does not succeed in creating expected synergies and benefits  
- Failure to restore consumer confidence in Boeing as supplier  
- Boeing BIO1000 does not provide significant reasoning for customer replacement

**Mitigation**  
- Periodically review supplier relations and decide on partnership improvements/termination  
- High incitements for suppliers and Boeing employees to finish development and production as scheduled  
- Stress high fuel efficiency and long term benefits of environmentally conscious solutions
Unforeseen delays and complications arise, but there are still opportunities for Boeing.

**Establishing a strategic alliance with key industry leaders**
- Working on R&D with windmill producers such as Vestas
- Key solutions to improvements of both wings for windmills and aircrafts as these use the same carbon fiber components

**Establishing a strong maintenance unit**
- Currently done by airlines themselves
- Establish a low-cost unit offering attractive prices and swift service solutions

**Sourcing back the essential parts of production**
- Source back wing production from Mitsubishi (Japan), that currently represent a clear threat of forward integrating and utilizing their R&D knowledge from development of Boeing products
- Create jobs for union workers who have created multiple obstacles in the production of the Dreamliner
**Build to Fly** solves key issues with Supply Chain management

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact</strong></td>
<td></td>
</tr>
<tr>
<td>Contact phase has not ensured choice of first partner</td>
<td>Higher integration of PLM system to include suppliers</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
</tr>
<tr>
<td>Quality of work is not always optimal</td>
<td>Increased integration and collaboration between Boeing and supplier to combat potential issues as early as possible</td>
</tr>
<tr>
<td>Delays are not communicated properly</td>
<td>Increase knowledge sharing amongst Boeing and supplier, including weekly status meetings</td>
</tr>
<tr>
<td><strong>Contract</strong></td>
<td></td>
</tr>
<tr>
<td>Partners engagement in Boeing’s success is not sufficient</td>
<td>Move suppliers to a position as strategic partner and provide incitements for creating long term relationships</td>
</tr>
</tbody>
</table>
Differences

**Boeing 787 Dreamliner**
- 10-330 seats.
- 76 orders from 53 customers.
- Windows' are taller.
- With any luck, Boeing will ship the first 787 to customers in the fourth quarter of this year.
- Boeing's answer to the A350 1000 is the 747-8 Intercontinental, a new model of the world's first jumbojet.
- 150-205 million

**Airbus A350 XWB**
- 270-440 seats
- A350 has 505 from 32 customers (about what the 787 had at the same stage in its development)
- The A350 windows are wider
- Reaching the market in 2012-2015
- the A350 1000, will carry up to 100 passengers more than the biggest 787.
- Lists for $225-285 million

Similarities

- Long range
- 50 percent carbon fiber.
- >8,000 miles without refueling.
- Three models (although the smallest 787 may be dropped.)
A comparison of Aircraft Sales of Airbus and Boeing Between 1989-2007

Bus has surpassed Boeing in aircraft sales.
Future fuel prices are unpredictable.
C tendency have not yet hit Asia. Also distance served are mainly short range.

Almost entire LCC is short range travel

LCC market in Asia is not saturated
Urbanization provides future opportunities for regional air traffic

- Continuous expansion of major cities provide opportunities for regional air traffic to/from workplaces

- Increasing distance give grounds for complications and delays in terms of regular traffic
ICAO & FAA Regulations

ICAO = International Civil Aviation Organization
FAA = Federal Air Administration

Regulation limits the emissions of:

- Smoke
- Unburned hydrocarbons (HC)
- Carbon monoxide (CO)
- Oxides of nitrogen (Noₓ)
- Vented Fuel

Source: ICAO & FAA
Tourism trends in line with Boeing BIO1000
large technical developments within biofuel

No modification to current aircrafts required
Planes will run on 30% biofuel blend

Not enough biofuel available to completely
supply the industry
The industry uses 85 billion gallons of kerosene each year.

"Developing and commercializing
these low-carbon energy sources is the
right thing for our industry, for our
customers and for future generations."

Jim Albaugh, President and CEO of
Boeing Commercial Airplanes
The two initiatives will address union member challenges.
I expect Airbus to enter the short-range, single-aisle segment.

**Airbus’ response**

**Response #1**
Remain in long-range

**Response #2**
Enter short-range

**Consequences**

- Allow market share to Boeing
- Direct competition
- Divide market share
- “Build to Fly” will benefit Boeing
- First-mover advantage
Example 2: A focus on weight and landing gear will make BIO1000 a perfect fit for challenging airports.

Antônios Dumont Airport serves Rio de Janeiro, Brazil and has a very short runway. It is the city's second major airport behind the Rio de Janeiro-Galeão International Airport.